Annual Report 2008–09

World Institute of Sustainable Energy

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Reflections...

The year under review was one of continued growth and expansion for WISE. We extended our work to many more critical areas of development of sustainable energy in India. Our biggest ever research project titled 'Clean energy technology action plans for climate mitigation in Indian states' was initiated by the *Centre for Policy and Sustainability Research* this year. The project, funded by the UK Foreign and Commonwealth Office through the British High Commission in India, will continue till March 2010. It is a first-of-its-kind project in India and will focus on developing climate mitigation plans through clean energy deployment in the Indian states of Rajasthan, Karnataka, and Maharashtra. The *Centre for Policy & Sustainability Research* also organised a unique conference titled 'Climate Change India 2008' which was very well received. We believe that climate mitigation through accelerated deployment of clean energy is the most potent solution for the climate crisis, because adaptation, while essential, has its limits if climate really worsens, as predicted.

The MNRE funded project entrusted to WISE titled 'Techno-economic evaluation of solar power generation technologies' was another major highlight. The project was in certain ways, a logical result of the momentum generated by WISE's major event 'Solar India 2007' held in the previous year. Our report was one of the background documents that later led to the creation of the Jawaharlal Nehru National Solar Mission under the National Action Plan on Climate Change (NAPCC). WISE's *Centre for Solar Energy* expanded its activities by taking up advisory services for major corporates in the country. The pioneering study on 'Repowering of old wind farms in India' entrusted to our *Centre for Wind Power* by the Ministry of New and Renewable Energy (MNRE), Govt. of India, generated great interest in the government and the corporate world who found repowering to be an excellent opportunity for enhancing wind power capacity. 'Wind India 2008', WISE's pioneering biennial conference and exhibition has been the biggest wind power event held so far in India. The *Centre for Wind Power* also released a landmark report titled 'Wind power in India: towards a 5000 MW annual market by 2015'. Through such pioneering activities, the *Centre for Wind Power* continued to grow and entrench its presence as a one-stop knowledge provider for the wind sector in India.

WISE's *Centre for Regulatory Affairs* extended its work to Orissa when the Orissa Electricity Regulatory Commission appointed the Centre as the Consultant for RE tariff determination and RPS fixation. The highlight of the Centre's activities during the year and a clear indication of its capabilities was its shortlisting by the World Bank through a global tender for a project in Kosovo. Even though the work was finally awarded to another agency, the shortlisting along with two other international consultants was a major step for us. The Centre also conceived the curriculum for a special series of training programmes on RE regulation conducted at various locations in the country. The programme funded by the United States Agency for International Development (USAID) was implemented by the *Centre for Human Resource Development*. In the coming years, the *Centre for Regulatory Affairs* would emerge as a major destination for work related to RE policy and regulation.

'Green Energy', WISE's flagship publication brought out by the *Centre for Communications*, continued to inspire and educate thousands of readers all over the world. Thus, overall, 2008 was a year of great fulfillment for us in WISE, more so, as sustainable energy was on its way to becoming mainstream. Additional satisfaction ensues from the fact that we are able to contribute to the process of policy development, awareness creation, capacity building and market development, to help the process of mainstreaming. Our dedicated faculty and staff deserve all praise for their commitment and hard work. The Governing Council of WISE has been a beacon of support to all our efforts, and we also enjoyed the goodwill of our well-wishers from around the country. Thank you all.

G M Pillai
Director General
WISE

Centre for Wind Power

Combining dynamism with all-round expertise, *the Centre for Wind Power* aims to be the 'Knowledge Management Hub' for the robust and fast-growing Indian wind industry. From offering consultancy services to providing a 'sustainable' network for information dissemination, the Centre is also involved in strengthening industry-institution linkages and establishing one-on-one partnerships with global players for world-class training, policy research, project development, and skills enhancement.

CORE ACTIVITIES OF THE CENTRE

- Short-term and long-term training programmes in wind resource analysis, wind power management, etc., for wind industry professionals, academicians, students, and policy makers.
- Consultancy services to project developers, industries, research institutes, investors, state nodal agencies, power utilities, regulatory commissions, etc., for:
  - Due diligence—independent evaluation for wind resource, project financing, technical and policy issues.
  - Evaluation of techno-economic offers for investors.
  - Preparation of pre-feasibility reports and feasibility reports, and detailed project reports for wind power projects.
  - Wind resource assessment, micrositing, and wind farm design.
  - Performance analysis of wind turbines and wind farms.
  - Financial advisory for setting up wind power projects.
  - Knowledge management for wind power projects.
- Policy support to state electricity regulatory commissions, state nodal agencies etc., for promotion of wind power.
- Research and development studies, surveys, as well as analytical inputs for wind power development.
- Knowledge exchange with the academia and industry.

In line with WISE's objectives, the following activities were undertaken during 2008–09.

PROJECTS

- Conducting a study for assessing the potential and implications for retrofitting or repowering of wind turbines for old wind power projects in the state of Tamil Nadu. The project was sponsored by the Ministry of New and Renewable Energy (MNRE), Govt. of India.
- Preparation of a report titled *Wind power in India: towards a 5000 MW annual market by 2015*, providing a comprehensive survey of the industry's growth, market potential and policy development. The report was circulated free of cost to more than 500 key professionals and stakeholders from the wind energy sector in India and the feedback received from them was excellent. Several companies such as Kenersys, Batliboi enXco Pvt Ltd, Jyoti Ltd, etc., too appreciated WISE's efforts in bringing out such a comprehensive report. The circulation of the report was sponsored by MNRE, Centre for Wind Energy Technology (C-WET), Indian Wind Turbine Manufacturers' Association (IWTMA), and the Indian Wind Energy Association (InWEA).

TRAINING PROGRAMMES

Training Programme for Vestas Wind Technology India Pvt Ltd, Chennai

WISE had signed a long-term training agreement with Vestas Wind Technology India Pvt Ltd, Chennai, in 2005. As per the terms of the agreement, two induction training programmes were conducted in June and August 2008 respectively, details of which are as follows.

Training Programmes organised for Vestas India, Chennai

Date	Topic	No. of Participants	Venue
19-21June 2008	Induction Training Programme	46	Chennai
27-29 Aug 2008	Induction Training Programme	23	Chennai

International Training Programme in Collaboration with Garrad Hassan, UK

The *Centre for Wind Power*, in association with the internationally reputed renewable energy consultancy firm, Garrad Hassan and Partners Limited, UK, organised a unique two-day international training programme on 'Wind Farm Development and Financing' on 27–28 November 2008 in Chennai. This programme was the first-of-its-kind in India. The participants had the privilege of being enlightened on the complex issues related to wind farm development and financing by one of the world's most reputed international renewable energy consultancy firms and leading

Glimpses

'Wind India 2008' Conference

Dignitaries on the dais during the inaugural session.

Hans Jorgen Koch, Deputy State Secretary, Danish Energy Agency, Ministry of Climate and Energy, Denmark, inaugurating the 'Wind India 2008' exhibition.

Dr Pramod Deo, Chairman, CERC *(C)*, releasing the report *Wind power in India: towards a 5000 MW Annual Market by 2015*.

independent authority on wind energy, Garrad Hassan. The training programme provided in-depth knowledge on best practices adopted globally in wind farm development and financing, wind speed monitoring, wind farm optimisation, energy yield calculation, wind energy forecasting, and financial modeling and sensitivity analysis. Nearly 40 key professionals involved in management, finance, and wind resource assessment, belonging to various companies such as Suzlon, Enercon (I) Ltd, RRB Energy Ltd, Acciona, Ghodawat Industries, Jyoti Ltd, National Thermal Power Corporation, National Aerospace Ltd, Andhra Pradesh Transmission Corporation, etc., participated in the two-day programme.

CONFERENCE

Wind India 2008

Following the resounding success of its first wind conference titled 'Wind India 2006', the *Centre for Wind Power* organised the second conference and exhibition on wind power, 'Wind India 2008', on 25–26 November 2008 at the Chennai Trade Centre, Chennai. The event witnessed the participation of the global wind power industry and all associated stakeholders, including more than 15 Danish and European companies and consultants.

Noted national and international experts from the energy sector graced the conference, prominent among them being Dr Pramod Deo, Chairman, Central Electricity Regulatory Commission (CERC), New Delhi; Hans Jorgen Koch, Deputy State Secretary, Danish Energy Agency, Ministry of Climate and Energy, Denmark; Dr Andrew Garrad, CEO and Founder, Garrad Hassan and Partners Ltd, UK; V Subramanian, former Secretary, Ministry of New and Renewable Energy; and Ramesh Kymal, MD, Vestas Wind Technology India Pvt. Ltd., Chennai.

More than 400 delegates participated in the conference which witnessed the presence of high-level government officials, policy makers and regulators, as well as distinguished academicians, researchers, and industry chieftains from India and abroad. Eminent faculty, both from the national and global arena were key speakers, making highly topical presentations through seven extended sessions. Issues ranging from challenges and opportunities in expanding the wind market to tackling challenges in grid integration, the economics and financing of wind power, and innovations for growth of the wind sector were discussed at the two-day conference.

Awards were presented to stalwarts from the wind industry and some of its major allies in recognition of the efforts rendered by them in shaping a greener India. The awards given under 11 different categories were the second in the series initiated and institutionalised in 'Wind India 2006'. The 'Wind India 2008' exhibition with more than

55 exhibitors from India and abroad drew an enthusiastic response from the delegates as well as the general public. The main attraction at the exhibition was the exclusive Danish pavilion with prominent wind industry and associated companies from Denmark. Leading Indian wind sector companies also participated.

OTHER ACTIVITIES

National Working Group for Repowering of Old Wind Turbines

Based on the recommendations made by WISE in the report titled, *Assessment of the potential and implications for retrofitting or repowering of wind turbines for old wind power projects in the state of Tamil Nadu*, MNRE constituted a working group to take up follow-up activities. The Working Group is responsible for making suggestions for taking up pilot projects, determining strategies for repowering, recommending incentives, and sharing of the financial burden by central and state governments.

The first meeting of the working group was held at the Centre for Wind Energy Technology (C-WET), Chennai, on 29 December 2008. The meeting was attended by senior officials from WISE, MNRE, C-WET, Tamil Nadu Energy Development Agency (TEDA), Tamil Nadu Electricity Board (TNEB), Indian Wind Power Association (IWPA), and IWTMA. WISE was asked to prepare a presentation on repowering and related issues in Tamil Nadu. The Head, *Centre for Wind Power*, WISE, participated in the meeting and made the presentation before the group.

FUTURE ACTIVITIES OF THE CENTRE

- Offering consultancy services to investors from different sectors for installation and commissioning of wind power projects.
- Contributing to wind energy and off-grid solar applications for WISE's project titled 'Clean Energy Technology Action Plans for Climate Mitigation for Karnataka, Maharashtra and Rajasthan', funded by the UK Foreign and Commonwealth Office (UKFCO) and supported by the British High Commission in India.
- Preparing a strategic roadmap for developing the market for small wind turbines and wind-solar hybrid systems in India for MNRE.
- Taking up R&D projects on wind energy forecasting.

Glimpses

'Wind India 2008' Exhibition

Centre for Policy & Sustainability Research

The *Centre for Policy and Sustainability Research* conducts strategic policy analysis and in-depth research in the core areas of climate change and sustainable energy. The Centre aims to design policy alternatives and scenarios that integrate sustainable development into the broader societal policy framework, through continuous interaction with global thinkers and policy makers. It is the only multi-disciplinary centre in India with expertise in environmental economics, energy engineering, and ecology and development.

The core activities of the *Centre for Policy and Sustainability Research* (CPSR) include policy research, strategic consultancy and fostering larger awareness and debate through conferences/seminars and publications. For the year 2008–09, CPSR carried out the following activities.

RESEARCH

In the course of the year, the following studies were undertaken:

1. The third report entitled *Renewable Energy Vision–2020 for the Union Territory of Puducherry* was completed and submitted to the Govt. of Puducherry. This report covers the combined challenges posed by global climate change, the peaking of fossil fuels and the need for future energy security as well as food security. It indicates the falling cost trends and improving technology performance of RE technologies and the emergence of clean technologies. In the light of these developments, it posits the need for rapid implementation of the RE Vision for Puducherry and the range of policy options open for selection.

2. A study to make the Indian operations of a large multinational company carbon-neutral was undertaken and completed. The study developed the methodology to be applied for estimating the emissions during company operations and provided detailed formats for data acquisition with respect to emissions from operations. Alternatives for quantitative emissions reduction were suggested, which was followed by offsets of the irreducible emissions. The capacity of wind turbine installations that would offset the irreducible emissions was calculated, thus rendering the entire operations carbon-neutral.

3. A policy study entitled *Techno-economic evaluation of solar power generation technologies for determination of tariffs and other incentives in India* was undertaken for the Ministry of New and Renewable Energy (MNRE), Govt. of India. This was a pathbreaking study in the Indian context. The study evaluated a total of 11 solar configurations, consisting of both solar thermal and solar PV generation systems. Both cost of generation and tariff were computed for each configuration, using customised software developed in-house. The study also analysed future cost trends for the various configurations with sensitivity analysis for the various technologies. Based on these computational analyses, the study generated a range of policy options for providing support for grid-connected solar generation systems as well as regulatory issues that would have to be dealt with for grid-connected systems.

4. The Centre also undertook a consultancy project for a large corporate client in the field of solar power generation. The client, with an established presence in conventional generation, was interested in exploring the technical and financial implications of large-scale investment in grid-connected solar power generation.

5. The project titled 'Clean Energy Technology Action Plans for Climate Mitigation in Indian States' was initiated this year. The three states to be covered are Maharashtra, Karnataka, and Rajasthan. The project is funded by the UK Foreign and Commonwealth Office (UKFCO) and supported by the British High Commission in India. MNRE also extended support to this initiative, with a Steering Committee chaired by Jt. Secretary, MNRE, being set up to guide the initiative. It is for the first time that a project of this nature has been taken up at the state level for the development of action plans for climate mitigation. The project is to continue up to March 2010.

CONFERENCE

Climate Change India 2008

The Centre organised the national conference 'Climate Change India 2008' on 22–23 April 2008 at Le Meridien, Pune, with a view to identifying causes and searching for solutions for combating climate change. World renowned environmentalist and founder of New Delhi-based NGO Navdanya, Dr Vandana Shiva inaugurated the conference, the first-of-its-kind to be held in the country, with a special focus on India. The greatest inter-disciplinary and inter-sectoral gathering of researchers, academicians, policy makers,

Glimpses

'Climate Change India 2008' Conference

Delegates at the conference.

Renowned social worker and environmentalist Dr Mohan Dharia *(R)* in conversation with G M Pillai, DG, WISE *(C)*.

One of the recipients of the 'Climate Change India 2008' award being felicitated by Dr Vandana Shiva.

industry chieftains, representatives of the renewable energy industry, financial and insurance sector professionals, and social activists were present for this two-day event. Presentations were made on issues ranging from impacts of climate change on each sector of the economy, including primary resources, production, infrastructure, industry, financial and social sectors. Most importantly, the conference discussed adaptation and mitigation strategies relevant to India, to ensure sustainable economic development in the 21st century.

One of the highlights of the conference was the felicitation of six eminent authors from the Intergovernmental Panel on Climate Change (IPCC) in recognition of the public service rendered by them towards preparation of the Fourth IPCC Assessment Report. They included Dr Joyashree Roy, Professor and Head of the Department of Economics, Jadavpur University, Kolkata; Dr G Srinivasan, Director, Climate Cell, India Meteorological Department (IMD), New Delhi; Dr K Krishnakumar, Programme Manager for Climate Dynamics and Climate Change, Indian Institute of Tropical Meteorology, Pune; Dr Raman Sukumar, Professor and Chairman, Centre for Ecological Sciences, Indian Institute of Science, Bangalore; Dr Vachaspati Thapliyal, former Deputy Director General of Meteorology and Former Director, Long Range Forecasting, IMD, New Delhi; and Dr Manmohan Kapshe, Professor, Maulana Azad National Institute of Technology, Bhopal.

CPSR presented the theme paper of the conference, *Way forward to realise new policies*, outlining the range of policy measures that need to be considered at the national level for dealing with future climate change. The theme paper was discussed by a high powered panel chaired by Dr Pramod Deo, Chairman, Central Electricity Regulatory Commission (CERC). The panelists were highly supportive of the draft document which provided a roadmap to decarbonise the atmosphere as well as the nation's economy, and also listed climate-friendly policy options and instruments to achieve this. The theme paper was later presented to the Prime Minister's Council on Climate Change .

Dr Vandana Shiva interacting with the delegates.

(From L to R) G M Pillai, DG, WISE; V Subramanian, Secretary, MNRE; and Dr Pramod Deo, Chairman, CERC, at the valedictory session.

The CEO's forum in progress.

OTHER ACTIVITIES

1. The Centre collaborated with a visiting team from New Energy Foundation, Japan, in a study on RE based microgrids for electrification in remote villages. This collaboration was undertaken under the auspices of the Asia-Pacific Partnership on Clean Development and Climate and supported by MNRE.

2. The Centre hosted a visit for an academic team from the University of Nottingham, to explore the formation of a UK-India Sustainable Energy Technologies Network between various collaborating institutions in both UK and India.

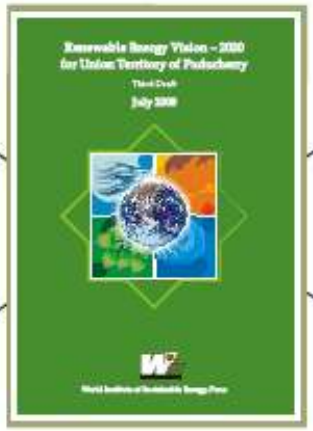
3. The Centre arranged a public lecture by Prof. Tim Flannery, noted environmentalist and author at the University of Pune on behalf of the Australian High Commission. The public lecture was held on the occasion of Gandhi Jayanti on 2 October 2008.

4. Sr. Fellow & Head, CPSR, co-chaired a pre-conference session on 'Energy Security and Sustainable Development in Asia and the Pacific', organised by the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP) in Bangkok. The session was attended by officials representing 53 governments in the Asia-Pacific region, including China, Russia, Japan, US, and India, as well as countries of South-east Asia and Central Asia, and island states, and major organisations within the UN system.

5. Sr. Fellow & Head, CPSR, attended 'Copenmind 2008' conference and exhibition on Cleantech held at Bela Centre, Copenhagen. The conference was addressed by Connie Hedegaard, Danish Minister for Climate and Energy, and was widely attended by leading universities, research centres and exhibitors from around the world.

FUTURE ACTIVITIES

- The project titled 'Clean Energy Technology Action Plans for Climate Mitigation in Indian States: Maharashtra, Karnataka and Rajasthan' will continue into its second phase, which includes discussion and finalisation of the draft report with representatives of the state governments based on their feedback.
- Undertaking collaborations with global institution/NGOs for conducting research studies on climate policy and mitigation.
- Undertaking in-depth and analytical studies for the Govt. of India on RE technologies and climate change.
- Networking with national and international associations and academic institutions for joint research and exchange of information on climate and sustainability.
- Preparing and finalising study reports for major corporate clients.



Centre for Regulatory Affairs

The *Centre for Regulatory Affairs* suitably amalgamates policy initiatives with regulatory intervention to provide a sustainable economic framework for the development of renewable energy in India. It works hand-in-hand with state electricity regulatory commissions to bring about suitable policy reform and growth in the RE sector. The Centre aims to act as a holistic knowledge centre in the area of RE policy and regulation, providing institutional support for facilitating the transition to a green energy economy.

CORE ACTIVITIES OF THE CENTRE

Policy research and consultancy is one of the core areas of WISE and the institute is committed towards developing policy initiatives aimed at promoting sustainable economic and fiscal measures for ensuring an energy secure future.

The National Action Plan on Climate Change (NAPCC) released by the Prime Minister's Council on Climate Change has recommended the national renewable standard to be set at 5% starting from 2009–10, to be increased by 1% for each subsequent year. The NAPCC also discussed the need for introduction of tradable renewable energy certificates (RECs) to facilitate the renewable purchase obligation (RPO) effectively. Similarly, the National Solar Mission announced by the Ministry of New and Renewable Energy (MNRE) specifies ambitious capacity addition plans for grid connected/off-grid solar power projects as well as for setting up solar collectors for heat energy applications. These new developments need skilled manpower for effective implementation of regulatory issues as envisaged in these initiatives. The *Centre for Regulatory Affairs* was established by WISE for this very purpose, and to act as a holistic resource/knowledge centre in the regulatory arena for facilitating development of renewables in India.

WISE intends to get registered with all state electricity regulatory commissions (SERCs) to provide institutional support to them in a holistic and systematic manner for facilitating the transition to a sustainable energy economy. The *Centre for Regulatory Affairs* is responsible for assisting SERCs and state nodal agencies (SNAs) in matters related to the following activities:

- Formulating regulations for power procurement from renewable energy sources.
- Developing terms and conditions for determining tariff for renewable energy sources.
- Reviewing new tariff orders for procurement of power from renewable energy sources.
- Reviewing/designing of renewable purchase obligation.
- Developing renewable energy policies for Indian states.
- Scrutinising Aggregate Revenue Requirement (ARR) filed by utilities with the SERC.
- Conducting training programmes in the areas of policy and regulation.

In a similar way, the Centre also provides consultancy services to corporate companies in the area of RE policy and regulation. This includes feasibility analysis of state-wise policies and regulatory environment, and assessment of risks to facilitate the decision-making process.

The following activities were carried out during 2008–09.

CONSULTANCY

A. Consultancy support to Maharashtra Electricity Regulatory Commission (MERC)

WISE has been providing consultancy support on a retainership basis to the Maharashtra Electricity Regulatory Commission (MERC) since 1 March 2006. WISE has posted 4 consultants on a full-time basis in MERC for a period of 3 years and is assisting the Commission in performing specific functions related to utility operation areas, such as monitoring compliance of directives related to operational technical areas by the licensees, standards of performance, consumer grievances, energy accounting, energy auditing, load management and DSM, etc. Some of the important assignments completed by WISE at MERC during 2008–09 include:

- Summarising the Commission's orders for inclusion in the Annual Report.
- Making presentations on various regulatory issues.
- Drafting press notes and public notices on various regulatory matters.

B. Consultancy support to Orissa Electricity Regulatory Commission (OERC) on determination of tariff for various RE technologies/Renewable Portfolio Standard fixation and RE policy formulation.

OERC entrusted this assignment to the *Centre for Regulatory Affairs* on 18 February 2009. The scope of the contract included undertaking a study to ascertain the RE potential in the state, developing normative parameters for determination of tariff for potential RE sources in the state, recommending appropriate tariff fixation methodology and determining tariff for wind, solar, SHP, biomass and co-generation power projects. The study also required the Centre to propose the appropriate power mix for Orissa comprising renewable and non-renewable sources under the renewable purchase obligation, in line with the Electricity Act, 2003, and National Electricity Policy. Consequently, the report covering issues such as fixing a cap on RE tariff, project specific/generic tariff, single part vs two part tariff, factoring of subsidy and incentives in the tariff, sharing of CDM benefit, grid connectivity and evacuation arrangement, etc., was submitted to OERC. Based on the report submitted by the Centre, OERC issued the tariff order for grid-connected SPV power projects specifying a tariff of Rs.15/kWh for the first 12 years after commissioning of the project, and Rs.7.5/kWh from the 13th to the 25th year.

PROJECT

Developing regulatory framework for the energy regulatory office (ERO) in the Balkan province of Kosovo for promotion of renewable energy systems (RES): A World Bank project

The *Centre for Regulatory Affairs*, in collaboration with M/s Noesis Strategic Consulting Services, New Delhi, participated in the above tender issued by the World Bank. The primary objective of this project was to support the ERO in Kosovo to develop the main components of the regulatory framework for renewable energy systems that fall under its jurisdiction, and to enhance the ERO's capacity to perform such regulatory tasks, drawing on international best practices. The scope of work included: developing practical procedures and a practical methodology for RES licensing (where licenses are required) and tariff-based electricity pricing for RES resources, designing practical yet efficient RES support mechanisms for each renewable resource eligible for support (including evaluation of the utility for surcharge on the transmission system operator) and proposing a design of such surcharge, establishment of a reliable system of issuing certificates of origin for RES electricity, training regulatory staff on best practices in RES regulation, etc. The *Centre for Regulatory Affairs* qualified in the technical bid for the above tender.

TRAINING

Participation in the USAID (United States Agency for International Development) training programme

The *Centre for Regulatory Affairs* actively participated in the USAID sponsored training programme conducted during 2008–09 on 'Regulatory and Policy Framework for Market Development for Renewable Energy' under its Distribution Reform, Upgrades and Management (DRUM) project. The *Centre for Regulatory Affairs* was involved in designing the programme content and preparation of course material for the delegates.

FUTURE ACTIVITIES

- Organising a national level conference on 'RE Regulation in India'.
- Consultancy support to SERCs in the area of RE tariff fixation, RPS and RE policy.
- Consultancy support to corporate companies in the area of RE policy and regulation.
- Conducting short-term training programmes/seminars in the regulatory arena.
- Participation in World Bank assignments in the area of RE policy and regulation.

Centre for Solar Energy

The *Centre for Solar Energy* strives to be the one-stop solar destination for the mushrooming solar industry in India by offering end-to-end solutions and other comprehensive services for holistic development of the solar sector. The Centre's multifarious activities, including research, consultancy, training and capacity building, aim to strengthen as well as facilitate development of solar energy in the country. Through its focused vision and skilled expertise, the *Centre for Solar Energy* is fast emerging as the trusted authority in this field.

The core objectives of the *Centre for Solar Energy* are:

- To document global best practices in solar energy policy and technology deployment, assess their suitability to the Indian environment, and advocate their implementation in the country.
- To develop a long-term Solar Energy Policy Roadmap for the country and follow up its implementation.
- To develop state-wise profiles for rapid deployment of solar energy wherever possible.
- To facilitate human resource development in the solar energy sector through curriculum development and training.
- To carry out research, surveys and analytical studies for the solar energy sector.
- To offer consultancy services to entrepreneurs, developers, industries, institutions, government agencies, regulatory commissions, etc., for the growth of the solar energy sector.

The activities of the Centre include the following:

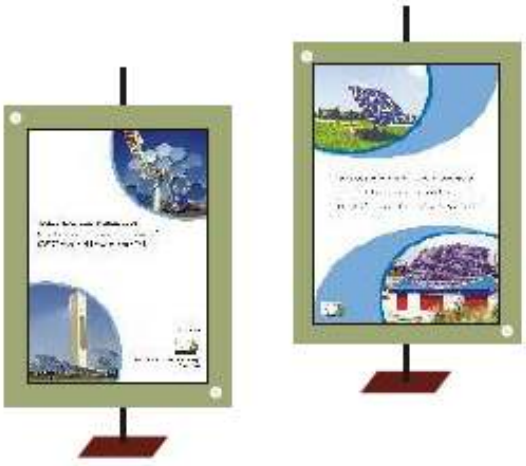
- Assess solar energy resources available in favourable regions across the country and impact analysis for associated factors.
- Prepare detailed financial modeling of solar power projects in the country.
- Track global developments related to solar power technology developments along with their policy and regulatory framework.
- Make an analysis of such developments with reference to applicability in the Indian context along with associated implications.
- Maintain an up-to-date record of central and state level policies and projects related to solar power and analyse and interpret this data with the aim of accelerating development of the solar sector.
- Carry out research and knowledge-oriented studies to cater to new developments in the sector and explore issues related to futuristic solar energy technologies such as hybrid power projects incorporating solar power, solar power based desalination of sea water, etc.
- Serve as consultant to investors, project developers, industrial houses, government and non-government agencies as well as regulatory authorities; offering end-to-end solutions for solar power development.

PROJECTS

Techno-economic analysis of solar power generation technologies and preparation of Detailed Project Report

G V K Industries Limited, Mumbai, entrusted WISE with a major assignment of assessing the techno-economic feasibility of emerging grid-connected solar power generation technologies (both thermal and photovoltaic) and thereafter, preparing the Detailed Project Report for best technology and configuration for three 10 MW capacity pilot projects, using different solar power generation technologies.

Techno-economic analysis of solar power generation technologies of different configurations (photovoltaic and thermal) was done in



detail. The work involved: a) collection of cost related data from Indian and foreign manufacturers, experts and academicians, b) calculation of cost of generation for different configurations, c) development of financial simulation model for profit and loss sheets and cash flow, d) sensitivity analysis for the proposed project, e) recommendation on best commercially viable technology for further DPR preparation, and f) preparation of Detailed Project Report for recommended solar technology for three projects of capacity of 10 MW each.

Techno-economic analysis of grid-connected solar thermal, PV and CPV technologies

Suzlon Energy Ltd., one of the leading global wind turbine manufacturers expressed interest in exploring grid-connected solar power projects in India. The purpose of this assignment was to conduct techno-economic analysis of grid-connected solar thermal, photovoltaic and concentrated photovoltaic technologies, with their cost of generation and simulation analysis for relative cost economics, and recommendation of appropriate solar technology for setting up of such projects.

Similarly, the company also wanted WISE to conduct a feasibility study on wind and solar hybrid systems to be set up in existing/upcoming wind farm sites. The study covered 13 states across India and was completed successfully.

FUTURE ACTIVITIES

- Offering end-to-end services and solutions for the complete spectrum of solar power generation activities.
- Supporting power utilities in implementing their solar power project development plans.
- Rendering consultancy services to state nodal agencies in preparation of roadmaps for accelerating growth of the solar energy sector.
- Assessing the market potential of solar photovoltaic power systems deployment by large photovoltaic system providers.
- Techno-commercial modeling of solar energy-based seawater desalination projects for commercial adoption, with financial assistance from MNRE.

Centre for Human Resource Development

Technology leapfrogging in the RE sector is creating a huge void in human resources, with demand surpassing actual volumes. In this scenario, the need for skilled manpower and enhancing technical proficiencies becomes extremely critical. The *Centre for Human Resource Development* strives to meet this very objective by engaging in various capacity building and training activities. Besides developing new talent for the fast emerging renewable energy sector, the Centre is also responsible for in-house capacity building.

The *Centre for Human Resource Development* (CHRD) at WISE assumes a strategic role in creating skilled manpower to cater to the needs of the growing renewable energy (RE) industry.

The core activities of the Centre are:

- Organising training programmes/conferences/seminars that would act as a catalyst in influencing policy decisions and bring about reforms to facilitate development of renewable energy.
- Conducting in-house training for WISE personnel so as to enhance capacity building and create core competencies within the institute.

In keeping with the objective of WISE to enhance capabilities in the RE sector, CHRD has been organising short-term and long-term training programmes for professionals from the sector, besides playing a pivotal role in conducting major RE related conferences. Some of the major programmes organised and/or conducted by the Centre during 2008–09 are as follows.

TRAINING PROGRAMMES

Regulatory and Policy Framework for Market Development for Renewable Energy in India

Under the aegis of the Ministry of Power (MoP) and the US Agency for International Development (USAID), WISE launched the first phase of training programmes focused on regulatory and policy issues aimed at market development of RE in India. The programmes were held under the Distribution Reform, Upgrades and Management (DRUM) project of USAID in the cities of New Delhi, Bengaluru, Mumbai, Jaipur, Bhubaneshwar, Kolkata, Vadodara and Thiruvananthapuram. The series of programmes are designed to train senior level staff from state electricity regulatory commissions, energy development agencies, power distribution and transmission companies; personnel from financial institutions; RE equipment manufacturers and investors; and the faculty of engineering colleges in the area of emerging regulatory and policy aspects related to RE. The training programmes were structured to include technology-specific and issue-specific presentations covering all necessary aspects of RE. The programmes were conducted by experts from WISE, as well as those from advisory firms and the RE industry. In all, more than 400 participants from all over India and neighbouring countries of Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka took part in the training series.

Glimpses

USAID training programme on Regulatory and Policy Framework for Market Development for RE in India.

23–24 July 2008, New Delhi

Gauri Singh, Jt. Secretary, MNRE, lighting the ceremonial lamp at the inauguration of the New Delhi training programme. With her *(from L to R)* are Gaurav Bhatiani, Project Managament Specialist, USAID; and S Padmanabhan, Director, SARI-USAID.

21–22 August 2008, Bengaluru

(From R to L) L Radhakrishnan, Secretary to the Govt. of Kerala (Power & Ports) and Pradip Vasvikar, Sr. Fellow & Head, CSE, WISE, at the inaugural session.

11–12 September 2008, Mumbai

(From R to L) A Velayutham, acting Chairman, MERC, and Sanjeev Ghotge, Sr. Fellow & Head, CPSR, WISE, at the inaugural session.

Training Programme for Wind Power Professionals

In accordance with the MoU signed between WISE and Vestas Wind Technology India Private Ltd, Chennai, two induction training programmes were conducted for wind power professionals in the financial year 2008–09 (for details refer to pg.1). The purpose of these programmes was to offer training to newly-inducted professionals to equip them for a career in the wind power industry. The course material for the programmes were attractively designed by the *Centre for Human Resource Development* and presented to the participants.

CONFERENCES

The Centre provided the crucial spadework for conducting two major conferences during 2008–09. Working behind the scenes, the Centre offered logistical and organisational support for 'Climate Change India 2008' held on 22–23 April 2008 in Pune (details on pg.5) and 'Wind India 2008' held on 25–26 November 2008 in Chennai (details on pg.2).

PUBLIC LECTURE

The *Centre for Human Resource Development* provided logistical support to the public lecture organised by WISE in January 2009 on 'We are the weather makers: an exposition on global climate change'. The speaker was renowned Australian environmentalist and global warming activist Prof Tim Flannery. The lecture was held at the Pune University and was attended by nearly 100 people.

FUTURE ACTIVITIES

- Conducting training programmes for professionals in the renewable energy sector.
- Initiating the second phase of training programmes focusing on regulatory and policy issues aimed at market development of RE in India, conducted in collaboration with the US Agency for International Development.
- Providing logistical support for the project titled 'Clean Energy Technology Action Plans for Climate Mitigation' in the states of Maharashtra, Karnataka, and Rajasthan, funded by the UK Foreign and Commonwealth Office (UKFCO) and supported by the British High Commission in India.
- Undertaking preparatory work for organising a major conference on renewable energy regulation with a special focus on India.

Glimpses (...contd)

6–7 October 2008, Jaipur

Ajai Vikram Singh, former Secretary, MNRE, and Ministry of Defence speaking at the inaugural session of the training programme. Sitting *(R)* is Dr Pramod Deo, Chairman, CERC.

22–23 October 2008, Bhubaneshwar

(From L to R) Pradip Vesvikar, Sr. Fellow & Head, CSE, WISE; B K Das, Chairperson, OERC; and Chinmaya Kumar, Dy. Director, USAID, at the inaugural session.

22–23 December 2008, Vadodara

V H Buch *(R)* Director, Gujarat Energy Development Agency, at the inaugural session of the training programme.

Centre for Communications

From being the 'Information and Knowledge' window into the world of renewable energy, the *Centre for Communications* has redefined its role and emerged as a more proactive and potent player in the area of information networking, knowledge dissemination and awareness generation. Its three critical sub-sections viz publications, information technology, and the library and documentation centre, form the core of the Centre and together, enrich the process of communication manifold.

The following activities were carried out by the *Centre for Communications* in 2008–09.

PUBLICATIONS

Green Energy

Green Energy, the only holistic publication on sustainable energy in India, continues to inspire and educate readers through reliable and up-to-date information about renewable energy technologies, and sustainable and green living from around the world. Published by WISE since 2004, the magazine has grown in stature and content over the years, and continues to remain firmly committed to the cause of sustainable growth and development. With each passing year, the magazine attempts to reach out to an ever-widening audience.

Five issues of *Green Energy* were published during the financial year 2008–09, namely the May–June 2008, July–August 2008, September–October & November–December 2008 (double issue), January–February 2009, and the March–April 2009 issues. The Sept–Oct & Nov–Dec 2008 double issue was a special issue brought out in connection with 'Wind India 2008', WISE's premier conference and exhibition held in Chennai on 25–26 November 2008. The issue carried the theme 'Indian Wind Power: *Ready to Leap Forward*' and covered the whole spectrum of issues related to the wind energy sector in India. In-depth information was provided on the technological, economic, and policy and regulatory aspects of wind energy. Expert comments from top-level bureaucrats and government officials made the issue a wholesome and comprehensive volume.

The regular issues dealt at length with the phenomenal growth and immense potential of the renewable sector; the innovations happening in the sector; the policy and regulatory initiatives introduced at the regional, national and international levels to promote uptake of renewables; and the challenges posed by the sector. The phenomenon of climate change also featured prominently in the issues. Books related to the conventional energy, renewable energy and related sectors were critically analysed and reviewed, and the essence succinctly presented. Besides, *Green Energy* also provided readers with information on the various training programmes conducted by WISE for energy professionals.

Along with in-depth news and analysis, aesthetics has always played a major role in enhancing the appeal of *Green Energy*. In order to provide a more contemporary look, the magazine was revamped and the new-look magazine was presented to readers from the January–February 2009 issue onwards.

Annual Report

The *Centre for Communications* brought out the Annual Report 2007–08, which was highly appreciated for its attractive design and presentation.

PUBLICITY

Participation in Conferences and Exhibitions

During the financial year 2008–09, WISE participated in major conferences and exhibitions held in different parts of the country. They were:

- 'Urja 2008', the national exhibition on energy efficient and renewable energy products and technologies organised by the Society of Energy Engineers and Managers and the Centre for Innovation in Science and Social Action, held at the Town Hall, Kochi, Kerala, from 23–27 June 2008. The WISE stall at the exhibition drew many enthusiastic visitors, with the publications and books published by WISE receiving substantial appreciation.
- 'Renewable Energy India 2008 Expo' held at Pragati Maidan, New Delhi, from 21–23 August 2008. The exhibition organised by Exhibitions India Pvt. Ltd. brought together nearly 200 exhibitors. WISE's stall got a good response with visitors ranging from renewable energy developers and consultants, to academicians and students showing keen interest in WISE's activities. WISE's publications also drew accolades from one and all.
- The 18th 'International Engineering and Technology Fair' (IETF 2009) organised by the Confederation of Indian Industry at the Bangalore International Exhibition Centre from 23–26 February 2009. *Green Energy* was the supporting journal at the event. The WISE stall at the exhibition elicited a good response. The books published by WISE were also well-appreciated.
- Besides, WISE was one of the supporting organisations at the international workshop and seminar on 'Sustainable Utilisation of Tropical Biomass' held from 15–16 December 2008 at Thiruvananthapuram, Kerala.

Visitors at 'Urja 2008' held in Kochi, Kerala.

A view of the stalls at 'Renewable Energy India 2008' Expo.

PRINTING OF PUBLICITY MATERIAL

Publicity forms an integral function of the *Centre for Communications*. The Centre has been preparing brochures and other publicity material in connection with major events organised by WISE. The Event Announcement Brochure and the Conference Brochure for 'Wind India 2008' and 'Climate Change India 2008' organised by WISE was conceptualised and designed by the *Centre for Communications*. A new updated information brochure giving the latest details of WISE was also brought out by the Centre. Wall panels outlining the activities undertaken by the various Centres associated with WISE were also updated, designed and developed this year.

PUBLICITY MATERIAL

INFORMATION TECHNOLOGY

The Information Technology (IT) section attached to the *Centre for Communications* aims to integrate the process of information dissemination with high-tech communication technology, thus spreading the 'renewable energy' word to a global audience at the click of a button. In the process, it aims to develop a powerful 'sustainable' network, wherein sharing of knowledge and information enhances the process of sustainability manifold.

During the current financial year 2008–09, the IT section at WISE carried out the following assignments:

- **Portal Development for the British High Commission (BHC) Project:** This portal was specially developed for the BHC project titled 'Clean Energy Technology Action Plans for Climate Mitigation' in the Indian states of Maharashtra, Karnataka, and Rajasthan. The portal provided information related to state-level action plans for the systemic deployment of clean energy sources for climate mitigation across selected sectors in the above mentioned states .
- **Conference Website Development:** The IT section was responsible for conceptualising, designing and developing two major conference websites viz 'Climate Change India 2008' and 'Wind India 2008'. These included both the pre-conference and post-conference details, and operation and maintenance.
- **WISE Website Updation:** WISE's main website also underwent major revamping, in view of further enhancing its aesthetic value and facilitating ease of functioning.
- **E-copy of Green Energy:** The IT division is responsible for maintaining and mailing the e-copy of WISE's bimonthly publication, *Green Energy*. Started in 2006, the e-copy today enjoys a dedicated readership of more than 600 individuals and organisations from across the world.

Homepage of 'Clean Energy Technology Action Plans for Climate Mitigation for Indian States' website.

Homepage of WISE website.

Homepage of 'Climate Change India 2008'.

Homepage of 'Wind India 2008'.

LIBRARY AND DOCUMENTATION CENTRE

The WISE Library and Documentation Centre has emerged as a one-of-its-kind specialised information centre on energy, environment, and sustainable development. The library houses a comprehensive collection of books, journals, audio-visual resources and news clippings.

During 2008–09, the library possessed around 1730 books, 53 periodicals, and 73 titles of audio-visuals.

The core subject areas and its sub-categories are as follows:

SUSTAINABLE ENERGY

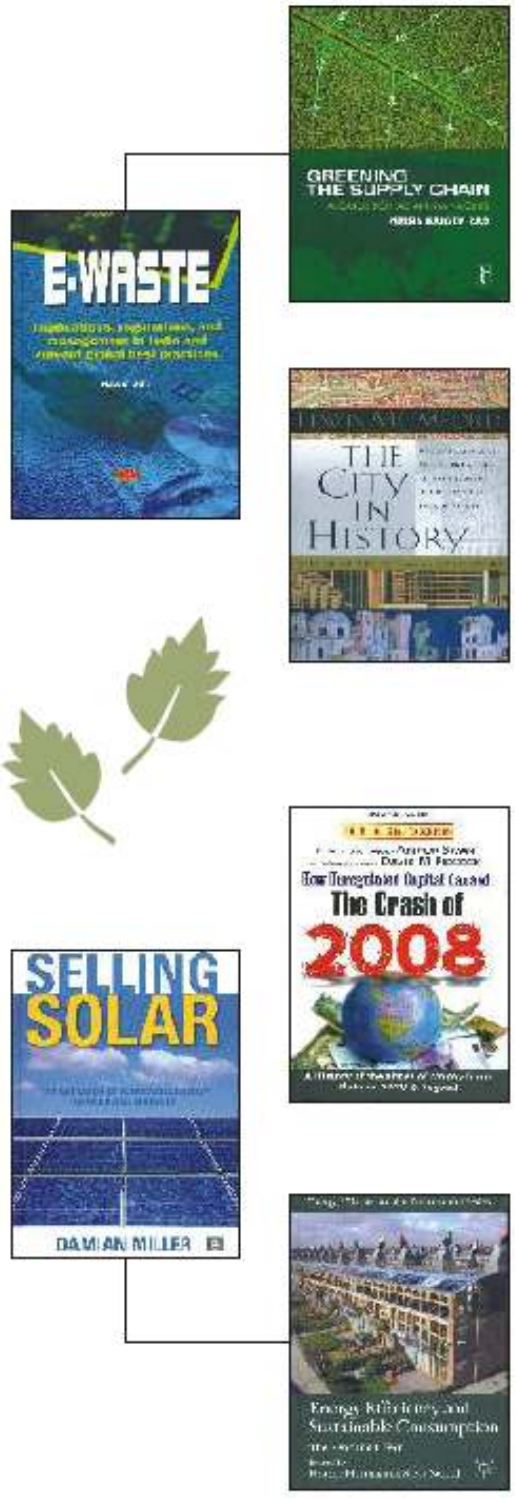
- Sustainable Energy (General)
- Bioenergy
- Solar Energy
- Wind Energy
- Hydrogen/Fuel Cells
- Other Renewables
- Rural Energy
- Co-generation

CONVENTIONAL POWER

- Electrical Engineering (General)
- Hydro Power
- Thermal Power/Coal and Gas
- Nuclear Energy
- Oil
- Transport
- Energy Efficiency/Conservation
- Energy Storage
- Energy Finance
- Policy, Reforms and Regulation

ENVIRONMENT & SUSTAINABLE DEVELOPMENT

- Environmental Philosophy
- Sustainable Development (General)
- Environmental Economics
- Material Science
- Restoration Ecology
- Sustainable Agriculture
- Water



- Environmental Management
- Biodiversity
- Green Building/Green Architecture
- CDM & Carbon Trading
- Cities
- Climate Change
- Futurology
- HRD/Education/Training
- Environmental Engineering
- Environmental History
- Environmental Law/Legislation

Reference

- Yearbook
- Dictionary
- Encyclopedia
- Directory
- Statistics/Guidebooks
- Reports

- **Economics**
- **Management**
- **Library and Information Science**
- **Globalisation**
- **Information Technology**
- **Nanotechnology**
- **General**

Status of Books/Periodicals/CDs for 2008–09

Total number of books purchased	: 290
Total number of books available	: 1730
Total number of periodicals available (39 subscribed and 14 complimentary)	: 53
Total number of CDs available	: 73

WISE Press

WISE Press conceptualises and publishes pioneering books on RE and sustainable development that provide a structured, analytical, and complete understanding of the core issues of sustainability. It seeks to transcend the barriers of poor technical information and non-availability of thorough and up-to-date research in the field of RE, thus filling the knowledge-deficit gap in this crucial area. Books by *WISE Press* are well-known for their succinct interpretation, clarity of thought, and ease of understanding.

WISE Press seeks to publish books that are 'agents of change', books that promote sustainable energy through increased understanding and practical know-how. It seeks to fulfill WISE's primary objective of being 'a premier outreach centre for communications, information and knowledge transfer, in the fields of sustainable energy, sustainable development and energy conservation'. *WISE Press* invites leading experts with first-hand knowledge and continuing involvement with their topics of expertise to write books that are produced to meet high standards, not only in terms of content but also in terms of production quality. Books from *WISE Press* continue to draw accolades from its readers as well as from visitors to the WISE stall (whenever the institute participates in any exhibition related to renewable energy). *WISE Press* does its own marketing and sales promotion, and its books are almost always sold directly to customers and seldom through book dealers.

BOOKS

Power Drain: Hidden subsidies for conventional power in India

Based on an exhaustive study of 19 representative conventional power projects (4 hydro, 9 coal-based thermal, and 6 gas-based thermal) in the public sector and the private sector that were commissioned or initiated in the decade preceding the Electricity Act, 2003, the book uncovers the enormous but hidden support—well over 150% on the original investment—extended to these projects by both central and state governments. It thus demolishes two myths: that renewable power is subsidised and that it is expensive.

A Solar Future for India

More than twenty of the proposed thirty chapters were copy-edited. After finalising the page layout and text typography, all the copy-edited chapters were made up into pages and page-proofs corrected. Where required, clarifications were obtained from authors. The book is now in the final stages and will be published in 2009–10.

OTHER ACTIVITIES

Wind India 2008 Souvenir

WISE Press played an important role in bringing out the conference souvenir for 'Wind India 2008', WISE's premier and biennial conference on wind power development in India held in November 2008 in Chennai.

Copy editing of project reports

WISE Press undertook copy editing of project reports and other documents, including *Wind power market survey* and *Wind power in India: towards a 5000 MW annual market by 2015* as required by the institute's research staff.